1.0 INTRODUCTION

1.1 THE ENVIRONMENTAL IMPACT STATEMENT

On May 26, 2000, the United States Department of Agriculture (USDA), Rural Utilities Service (RUS) announced the availability of the Draft Environmental Impact Statement (DEIS) in the *Federal Register* (Vol. 65, No. 103) for the Jackson County Lake Project. In addition to the *Federal Register*, public notices were published in the following newspapers in Kentucky: the *Lexington Herald-Leader* and the *Jackson County Sun*. The DEIS was made available for public review at a number of locations throughout the area in Kentucky, and was available over the Internet at RUS's website (http://www.usda.gov/rus/water/ees/deis-jc.htm). During the 45-day review period for the DEIS, RUS sponsored a public meeting, held in two sessions, to solicit comments from the public. The public meeting was announced in the *Federal Register* (Vol. 65, No. 103) on May 26, 2000 and in the above newspapers.

Comments on the DEIS were received from Federal and State agencies, environmental interest groups, and the public. Copies of all comments received as part of the DEIS public comment period and submitted at the public meeting are included in the Final Environmental Impact Statement (FEIS) as Appendix O.

In accordance with 40 Code of Federal Regulations (CFR) 1503.4, *Response to Comments*, RUS has individually and collectively considered all of the comments received from all parties on the DEIS. All comments are addressed in one of two locations in this FEIS. Responses to comments meriting new or additional analyses, or the presentation of new information, are presented in the text of the FEIS, in the appropriate section. Responses to comments determined to be outside the scope of the EIS, not particularly relevant to the decisions regarding the proposed action, or involving a direct referral to text of the DEIS are presented with the original comment letter in Appendix O. RUS has determined that the comments, while extensive on a few issues, does not warrant republication of the DEIS.

This FEIS incorporates the Jackson County Lake Project DEIS by reference, and contains only new information obtained and additional analyses conducted since the publication of the DEIS. This FEIS is organized according to the same section numbers and headings as presented in the DEIS. Where there is additional information for a section of the DEIS, or where additional analyses have been made, this information is presented in the text of the FEIS, under the appropriate section heading. Where a section contains no additional information for the FEIS, this fact is stated under that section heading. In all sections of the FEIS, the information contained in the DEIS is incorporated by reference. Additional section numbers and headings have been added to the text of the FEIS where such sections did not exist in the DEIS, particularly for the evaluation of alternatives.

1.2 PURPOSE AND NEED FOR ACTION

Although the projected water needs of Jackson County and the surrounding region, discussed in Section 1.2.2, Water Supply, below, have been revised for this FEIS, the purpose of the Jackson County Lake Project has not changed. The purpose of the project remains as follows:

- Provide adequate water supplies for the projected residential, commercial, and industrial needs of Jackson County, and part of one or more neighboring counties over the next 50 years; and

- Provide lake-based recreational opportunities to meet the present and future needs of the residents of Jackson County and surrounding areas.

1.2.1 WATER SUPPLY

In response to comments received on the DEIS from agencies and the public, the study team has closely reviewed Jackson County's existing water sources, population growth projections, per capita residential water consumption rates, and water conservation potential. In addition, the likelihood of exporting water to surrounding counties from a new source of water supply in Jackson County has been re-evaluated. These analyses establish the basic purpose and need of the project, as well as the sizing of any future water supply and transmission facilities.

The *Final Water Needs Analysis*, incorporated into Section 1.2.1, Water Supply, and Appendix E of the DEIS, contained low, moderate, and high projections for Jackson County through the year 2050. It also factored in an additional amount of water equal to 60 percent of Jackson County's 2050 water needs to account for potential regional demands. This figure was based on a survey of the reasonably foreseeable future water needs of several surrounding counties, as expressed by representatives of water utilities in those counties. The water needs calculations and projections have been re-examined, and a new set of projections has been developed based on new information and revised assumptions.

As discussed in the *Final Water Needs Analysis* there are currently three reservoirs in Jackson County: Tyner Lake (Lake Beulah), McKee Reservoir, and Multi-Purpose Structure (MPS) #1. The potential of these to supply water over the 50-year planning horizon is discussed briefly below. A more detailed discussion is provided in Appendix E of the DEIS.

JCWA and Tyner/Beulah Lake

Tyner Lake has an estimated sustainable yield of 700,000 gallons per day (gpd). Built in 1969, it is the primary existing water storage facility in Jackson County and the Jackson County Water Association's (JCWA) only such facility. Within the coming 20 years it will reach the limit of its design life and have to be taken off-line temporarily, for about one or two years, for extensive renovation, maintenance, and repair. Already there is some indication Tyner Lake has lost an undetermined amount of storage capacity due to excessive sedimentation and extensive bank

sloughing (Williams, 2000b). Nevertheless, for the purpose of this analysis, it is assumed that Jackson County will still obtain 700,000 gpd from Tyner Lake in the year 2050.

Since the publication of the DEIS in May 2000, the water level in Tyner Lake has remained 15 feet or more below normal pool level (JCWA, 2000). The water is so low, and has lost such hydraulic head, or pressure, that it does not flow at a sufficient rate by gravity through the intake and down to the JCWA Treatment Plant, necessitating the recent installation of a pump at the intake (Williams, 2000b).

The water supply situation has changed slightly in Jackson County since the publication of the DEIS. The JCWA has installed a temporary water intake on Laurel Fork, and built a 12-inch diameter pipeline to Tyner Lake capable of carrying up to 3.5 million gallons of per day (mgd) (Williams, 2000b). The length of this pipeline is 12,038 linear feet. The water intake at Laurel Fork rests on a manhole. Sandbags are used to hold back water, creating a pool for the intake approximately 18 inches deep (Williams, 2000c). This is a non-reservoir withdrawal; there is virtually no storage capacity at the intake site itself, and all withdrawals depend entirely upon stream flow. The Kentucky Division of Water (KDOW) permit allows withdrawal only when Laurel Fork flows exceed 2.5 cubic feet per second (cfs) (Caldwell, 2000).

In drawing from an additional drainage basin six times the size of Tyner's, this pipeline will allow Tyner Lake to refill much faster than at present. Nonetheless, Jackson County's water storage capacity will not be increased by this pipeline, which has been installed as a temporary stopgap measure. Pipelines from stream intakes not associated with impoundments will only partially improve the ability of the County to weather multi-year droughts, during which the flow of all small and mid-sized watercourses in the surrounding area would be minimal.

City of McKee and McKee Reservoir

McKee Reservoir and MPS #1 are both located in the headwaters of Bills Branch, upstream of the town of McKee. MPS #1 is a new facility just above McKee Reservoir, and was built primarily as a flood control structure, although it also has an estimated sustained water yield of 83,000 gpd. The McKee Reservoir's maximum yield is estimated at 188,000 gpd. Thus, the two facilities have a combined yield of 271,000 gpd. However, this yield must be considered as *potential*, rather than actual or existing. This is because the McKee water treatment plant is aging and in need of upgrading in order to maintain compliance with the requirements established in the U.S. Environmental Protection Agency's (EPA) national drinking water standards. Upgrading this treatment plant would most likely not occur, as it would not be cost feasible. Therefore, in order to utilize the water from McKee Reservoir and MPS #1 in the future, a water transmission pipeline would have to be constructed from these reservoirs to the JCWA Treatment Plant. Thus, the cost of constructing such a pipeline must be added onto any alternative that assumes the availability of these two water sources.

1.2.1.1 HISTORICAL DEMANDS

There are no changes to this section for the FEIS. Please refer to Section 1.2.1.1, Historical Demands, of the DEIS.

1.2.1.2 PROJECTED DEMANDS

In the *Final Water Needs Analysis*, Appendix E of the DEIS, potential future water needs for Jackson County were determined using ranges of plausible water use and population size projections. From these ranges, low, moderate, and high water needs projections were calculated. In the revised water needs analysis presented here, only one set of assumptions regarding water use rates and population projections was used to determine the potential future water needs of Jackson County and the surrounding region. These assumptions are discussed in the following sections, and together, they form the most probable growth and future water needs scenario for Jackson County.

1.2.1.2.1 Projected Water Consumption Rates

As in the *Final Water Needs Analysis*, three categories of water consumption were analyzed in the revised water needs analysis: residential, commercial, and industrial. Water use rates were calculated for each of these categories.

For residential water consumption, the amount of water used per person in a given time interval (the "per capita" use rate), was computed. The per capita use rate was derived from data compiled from the Kentucky Public Service Commission's (PSC) Annual Report Statistics Summaries for 1994 through 1997, which contain water consumption data for every water district, water association, and privately-owned water supplier reporting in the State. This was the most recent data available at the time of the analysis. The per capita use rate used in the revised water needs analysis is 67 gallons per person per day, which represents the average per capita use rate for Kentucky. This is the same rate used in the DEIS.

Comments received on the DEIS noted that the residential per capita water use rate of 67 gpd is higher than that which currently prevails in Jackson County, 54 gpd, and that this figure should not be used in this analysis. In 1999, the Kentucky Rural Water Association (KRWA) conducted a survey of residential water consumption rates for municipal systems, water districts, and water associations (Lange, 2000a). Of those responding, municipal systems averaged 59 gpd for residential consumption, water districts 64.4 gpd, and water associations 59 gpd. These figures are not a significant deviation, around 10 percent, from the State average reported from the Kentucky PSC. In addition, given the promise of EZ economic development initiatives in the County to lead to higher household incomes, it is reasonable to assume that per capita usage will rise to the State average over the next 50 years. Rising disposable incomes will probably lead to the more widespread purchase and use of water-intensive residential appliances, such as washing machines, and the greater use of water in residential landscaping.

A commercial per capita use rate of 30 gallons per person per day was determined to be the most probable use rate for the revised water needs analysis presented here. This commercial use rate was used in the moderate growth scenario presented in the *Final Water Needs Analysis*.

As in the *Final Water Needs Analysis*, industrial water use rates were based on the number of gallons used per acre of each industrial park per day. Only developed acres in industrial parks are served by a water provider. As discussed in Section 1.2.1.2.1, Projected Water Consumption

Rates, of the DEIS, the total number of industrial acres projected to be developed and served by a water provider by the year 2050 is 321.87 acres. An industrial water use rate of 200 gallons per acre per day (gpapd) was determined to be the most probable use rate for the revised water needs analysis. This industrial use rate was used in the moderate growth scenario presented in the *Final Water Needs Analysis*.

1.2.1.2.2 Population Projections

The water needs projections in the *Final Water Needs Analysis*, Appendix E of the DEIS, were based in part on University of Louisville, Kentucky Population Research (KPR) low, medium, and high demographic projections for Jackson County, which are now obsolete, and in part on the professional judgment of engineers and planners with experience in water demand and supply studies. KPR now publishes only one projection for each county in Kentucky to avoid the confusion caused by the earlier low, medium, and high projections.   In view of the updated projections from KPR, population and water needs projections for Jackson County have been recalculated. Four demographic scenarios for Jackson County are developed below, one of which has been designated as the most probable scenario for the County.

1. This scenario begins with the 1999 population estimate for Jackson County (13,040 people) from KPR, which is the same as that from the U.S. Census Bureau, and assumes that the population of Jackson County does not change (i.e., neither grows nor shrinks). This reflects the long-term demographic situation of Jackson County for approximately the past seven decades. Thus, the 2050 population under this scenario is assumed to be 13,040 people. By way of comparison, in the *Final Water Needs Analysis* the low-growth projection was 16,462 people by 2050.

2. This scenario begins with the 1999 population estimate for Jackson County (13,040 people) and calculates the exponential growth rate of the new population projection published by KPR for Jackson County to the year 2020. KPR's demographic projections factor in likely or reasonable projected industrial and commercial growth for each county, based on the county-specific information from the most recent past 10 years (Sawyer, 2000). In the case of Jackson County, this time frame would presumably include establishment of the Empowerment Zone (EZ). The exponential growth rate calculated for the new KPR population projection for Jackson County is 0.58 percent annually. This value is derived from the following standard exponential growth formula:

$$r = (\ln (N_t / N_0)) / t$$
$$\text{where:}$$
$$r = \text{annualized growth rate;}$$
$$\ln (N_t / N_0) = \text{the natural log of the ratio of the final population to the initial population; and}$$
$$t = \text{time in years.}$$

The exponential growth rate (0.58 percent annually) was then used to extrapolate population growth to the year 2050. The 2050 population is calculated to be 17,528 people. In comparison, in the *Final Water Needs Analysis*, the exponential growth rate

for the moderate scenario was 1.0 percent per year, with 21,738 people being the projected population for 2050. These projections do not count on potentially much higher growth if the EZ initiatives are successful.

3. This scenario begins with the 1999 population estimate for Jackson County (13,040 people) and uses the exponential growth rate of 1.3 percent, the rate used for the high growth scenario in the *Final Water Needs Analysis*. The same formula as used in the above scenario is applied to extrapolate Jackson County's population to the year 2050. The result is a projected population of 25,306 people. The growth rate used here was that of Pulaski County from 1960 through 1990. This growth rate is considered improbably high because of fundamental differences in geography, such as topography and existing infrastructure, between Jackson County and Pulaski County.

4. This scenario begins with the 1999 population estimate for Jackson County (13,040 people) and assumes that the average (exponential) growth rate evident from U.S. Census Bureau 1990 to 1999 population estimates for the County continues until the year 2050. The same formula as used in the above scenarios is applied to derive an exponential growth rate (0.965 percent annually) for this nine-year period, and then extrapolates Jackson County's population to the year 2050. The result is a projected population of 21,330 people.   This scenario is considered the most probable for Jackson County because it corresponds to the demographic trend of the most recent decade and recognizes future population growth at the same rate as a likely consequence of EZ initiatives.

1.2.1.3 REGIONAL DEMANDS

For the revised water needs analysis presented here, regional needs have been recalculated to be 42 percent of the Jackson County water need, as compared to 60 percent of the Jackson County need that was used in the *Final Water Needs Analysis.* This reduction in regional demands stems from the removal of Berea College's demand in the current projection; only the water demands of Clay, Rockcastle, and Owsley Counties are accounted for in the present analysis. As indicated in the *Final Water Needs Analysis*, Berea College was only interested in obtaining water from Jackson County if the location of the reservoir was near the Madison County boundary line. None of the alternatives evaluated in this EIS are located near this boundary line. A more detailed description of regional water needs is provided in the *Final Water Needs Analysis*, Appendix E, and Section 1.2.1.3, Regional Demands, of the DEIS.

Some comments received on the DEIS criticized the inclusion of regional water needs as not being justified and leading to analyses biased in favor of larger projects than necessary. However, such regionalization is a well-established trend in water supply (Caldwell, 1999), and one generally supported by government policy. The following are policies for the USDA, RUS Water and Waste Loans and Grants, as contained in regulations. Please refer to the full text of the regulations for more detailed information.

7 CFR §1780.7 (c) Eligible projects. (2) Projects must be designed and constructed so that adequate capacity will or can be made available to serve the present population of the

area to the extent feasible and to serve the reasonably foreseeable growth needs of the area to the extent practicable. (3) Projects must be necessary for orderly community development and consistent with a current comprehensive community water, waste disposal, or other current development plan for the rural area.

7 CFR §1780.7 (f) Economic feasibility.
All projects financed under the provisions of this section must be based on taxes, assessments, income, fees, or other satisfactory sources of revenues in an amount sufficient to provide for facility operation and maintenance, reasonable reserves, and debt payment. If the primary use of the facility is by business and the success or failure of the facility is dependent on the business, then the economic viability of that business must be assessed.

7 CFR 1780.11 Service area requirements. (a) All facilities financed under the provisions of this part shall be for public use. The facilities will be installed so as to serve any potential user within the service area who desires service and can be feasibly and legally served. This does not preclude:

7 CFR §1780.17 Selection priorities and process. When ranking eligible applications for consideration for limited funds, Agency officials must consider the priority items met by each application and the degree to which those priorities are met. Points will be awarded as follows:
(d) Other priorities. (1) The proposed project will: merge ownership, management, and operation of smaller facilities providing for more efficient management and economical service -- 15 points; (2) The proposed project will enlarge, extend, or otherwise modify existing facilities to provide service to additional rural areas--10 points;

7 CFR §1780.57 (e) Growth capacity.
Facilities should have sufficient capacity to provide for reasonable growth to the extent practicable.

7 CFR §1780.57 (n) Economical service. The facility's design must provide the most economical service practicable.

In addition to these RUS policies, the Safe Drinking Water Act (SDWA), 1996 Amendments, Section 1420, Capacity Development, requires that the U.S. Environmental Protection Agency (EPA) and State agencies ensure water systems have the technical, managerial, and financial capacity to meet National Primary Drinking Water Regulations. Capacity is defined as the ability of a water system to consistently provide safe drinking water for its customers (EPA,

> **Technical Capacity:** The physical infrastructure of the water system, including, but not limited to, the source water adequacy, infrastructure adequacy, and the ability of system personnel to implement the requisite technical knowledge.
>
> **Managerial Capacity:** The management structure of the water system, including, but not limited to, ownership accountability, staffing and organization, and effective linkages.
>
> **Financial Capacity:** The financial resources of the water system, including, but not limited to, the revenue sufficiency, credit worthiness, and fiscal controls.
>
> Source: EPA, 1998b

1998b). The different dimensions of capacity are defined in the text box. Additional information on Capacity Development under the 1996 Amendments to the SDWA can be obtained from the EPA's website at http://www.epa.gov/OGWDW/cdguid/capfact.html.

1.2.1.4 PROJECTED WATER NEEDS

In Section 1.2.1.4, Projected Water Needs, of the DEIS, and in the *Final Water Needs Analysis*, Appendix E of the DEIS, three water demand scenarios, low growth, moderate growth, and high growth, were computed for Jackson County and the surrounding region. For the revised water needs analysis presented here, only one water demand scenario, the "most probable" scenario, was calculated. This most probable scenario is broken down into two subparts: water needs for Jackson County only by the year 2050 and water needs for Jackson County and the surrounding region.

Table 1.2-15 lists the parameters used in calculating water needs for Jackson County and the surrounding region for the revised water needs analysis.

Table 1.2-15. Parameters Used for Water Needs Projections	
Jackson County 2050 Population	21,330 people
People Served in Jackson County by a Water Supplier by 2050	85 percent
Residential Use Rate (per person)	67 gpd
Commercial Use Rate (per person)	30 gpd
Total Developed Industrial Acres by 2050	321.87 acres
Industrial Use Rate	200 gpapd
Line Loss and Unaccounted For Water	15 percent
Water Conservation	10 percent
Regional Needs	42 percent of Jackson County's needs
Existing Supply: Tyner Lake	700,000 gpd
Existing Supply: McKee Reservoir and MPS #1	271,000 gpd
TOTAL Existing Supply for Jackson County	971,000 gpd

In the revised water needs analysis, the 2050 total water demand for Jackson County was computed by multiplying the most probable population growth projection by 0.85 to represent the population served by a public water supply, then multiplying the result by the residential per person use rate to determine the residential water demand. The commercial water demand for Jackson County was computed by multiplying the most probable population growth projection by the commercial per capita use rate. This differs from the methodology used in the *Final Water Needs Analysis* of the DEIS to calculate commercial water demand in that the total Jackson County population projection is considered, rather than the percent of households served by a public water supplier. Industrial water demand was calculated in the same manner presented in the DEIS.

As in the *Final Water Needs Analysis*, the total water demand is divided by 0.85 to account for 15 percent line loss and unaccounted for water. This is the amount of line loss and unaccounted

for water, as a percentage of total water produced, reported for McKee Water Works Water Treatment Plant in Jackson County in 1998 (CVADD, 1998). Rural water utilities generally have higher line loss due to longer pipelines for each average customer served (Lange, 2000a). It is used in the EIS to represent a reasonable amount of line loss or unaccounted for water that could be anticipated for a rural water association or district.

In the revised water needs analysis presented here, it is acknowledged that there is the potential for water conservation in Jackson County. Water conservation is discussed in Appendix G of the DEIS. Appendix G of the DEIS discusses the results of various studies designed to measure the impact of water conservation measures on consumer use rates. In addition, a recent report published by the United States General Accounting Office (GAO) projects long-term, nationwide reductions in water consumption through water efficient plumbing fixtures (GAO, 2000). Opportunities abound to use water more efficiently in the residential, commercial, and industrial sectors. A water savings of 10 percent from a variety of water conservation measures has been determined to be realistic and feasible (Deal, 2000; KRADD and CT, undated; Sullivan, 1999; USACE, 1997). Thus, a 10 percent conservation factor was applied across the board in the water needs computations, to all three sectors of water use, and to the line loss factor.

Existing sources of water supply in Jackson County that will still be in service over the next 50 years must be subtracted from the total water needs of the County. As discussed in Section 1.2.1, Water Supply, above, future yield from existing water storage and supply facilities that are assumed to be functioning within the 50-year period of analysis for the proposed action are 700,000 gpd from Tyner Lake, and potentially an additional 271,000 gpd from McKee Reservoir and MPS #1, if a transmission pipeline is built to connect them to the JCWA Treatment Plant and supply system. Thus, Jackson County can expect to have from 700,000 gpd (0.700 mgd) to 971,000 (0.971 mgd) of its 2050 water needs met by existing facilities. Due to the uncertainty of usable water supplies from McKee Reservoir and MPS #1, two calculations of water needs are presented here. One of these calculations assumes only the yield of Tyner Lake will be in service in 2050; the other assumes that the combined yield of all three existing reservoirs will be in service. For the purposes of determining which alternatives to investigate fully in the EIS, it was assumed that only Tyner Lake would be available as a source of water supply over the 50-year design life of the proposed action, due to the uncertainty of availability of water from McKee Reservoir and MPS #1. Therefore, the projected 2050 water needs for Jackson County and the surrounding region that assume availability of these two water sources were eliminated from the analysis.

Calculations of the revised 2050 water needs of Jackson County and the surrounding region are presented below.

Water Needs for Jackson County Only

Residential Consumption:

(67 gpd) * (0.85 people served * 21,330 people in Jackson County) =
(67 gpd) * (18,130.5 people) = 1,214,743.5 gpd

Commercial Consumption:

30 gpd * 21,330 people in Jackson County = 639,900 gpd

Industrial Consumption:

(200 gpapd) * (321.87 acres) = 64,374 gpd

Total Projected Consumption (Residential + Commercial + Industrial):

1,214,743.5 gpd + 639,900 gpd + 64,374 gpd = 1,919,017.5 gpd

Line Loss and Unaccounted For Water:

1,919,017.5 gpd / .85 (line loss) = 2,257,668 gpd

Water Conservation:

2,257,668 gpd – (2,256,609 gpd/10) = 2,031,901 gpd (Total Water Needed)

Less Total Existing Water Supply in Jackson County:

2,031,901 gpd – 971,000 gpd = **1,060,901 gpd** (Additional Water Needed)

Less Tyner Lake's Existing Water Supply ONLY:

2,031,901 gpd – 700,000 gpd = **1,331,901 gpd** (Additional Water Needed)

Water Needs for Jackson County and Surrounding Region:

Jackson County's Total Projected Water Consumption + Regional Need:

1,919,017.5 gpd * 1.42 = 2,725,005 gpd

Line Loss and Unaccounted For Water:

2,725,005 gpd / 0.85 (line loss) = 3,205,888 gpd

Water Conservation:

3,205,888 gpd – (3,205,888 gpd/10) = 2,885,299 gpd (Total Water Needed)

Less Total Existing Water Supply in Jackson County:

2,885,299 gpd – 971,000 gpd = **1,914,299 gpd** (Additional Water Needed)

Less Tyner Lake's Existing Water Supply ONLY:

2,885,299 gpd – 700,000 gpd = **2,185,299 gpd** (Additional Water Needed)

Table 1.2-16 summarizes the revised projected water needs for Jackson County and the surrounding region, based on the existing water supply assumed to still be in service in the County, in the year 2050.

Table 1.2-16. Projected 2050 Water Needs of Jackson County and the Region Based on Existing Water Supply		
	2050 Water Needs Less Existing Water Supply	
	Tyner Lake Only (0.700 mgd)	**Tyner Lake, McKee Reservoir, and MPS # 1 (0.971 mgd)**
Jackson County Only	1,331,901 gpd (1.3 mgd)	1,060,901 gpd (1.1 mgd)
Jackson County and the Region	2,185,299 gpd (2.2 mgd)	1,914,299 gpd (1.9 mgd)

1.2.2 RECREATION NEEDS

There are no changes to this section for the FEIS. Please refer to Section 1.2.2, Recreation Needs, of the DEIS.